



Practitioner's Docket No. 76125.00101

**PATENT**

Inventor: Stephen E. Silverman (deceased) and Marilyn K. Silverman

Title: **METHODS AND APPARATUS FOR EVALUATING NEAR-TERM SUICIDAL RISK  
USING VOCAL PARAMETERS**

Filing Date: August 22, 2001

Serial Number: 09/935,294

Group Art Unit: 2655

Examiner: Huyen X. Vo

### **SUPPLEMENTAL DECLARATION**

I hereby declare that I am a citizen of the United States of America, residing at and having a mailing address as indicated below, and that I am authorized to execute this Supplemental Declaration as a representative of the estate of Stephen E. Silverman, one of the inventors of record on the patent application identified above.

As Stephen E. Silverman is one of the named inventors on the above-referenced pending United States patent application, I hereby declare that I believe that Stephen E. Silverman co-invented the subject matter that is presently claimed, in the United States patent application referenced above, and that Stephen E. Silverman was an original, first and joint inventor of such subject matter and further that I understand that the claims pending in the United States patent application referenced above are those attached hereto as Attachment 1.

I hereby further declare that I believe the subject matter defined by the attached claims as currently pending in the above-referenced United States patent application was part of the invention for which Stephen E. Silverman was a joint inventor and was invented by Stephen E. Silverman and his joint inventor before the effective filing date to which the patent application, as above identified, is entitled.

I hereby further state that I have reviewed the contents of the application specification, including the claims pending in the application as such claims are attached hereto as Attachment 1 and that I believe Stephen E. Silverman understood the contents of the application specification, including the claims pending in the application as such claims are attached hereto as Attachment 1.

I acknowledge the duty to disclose, on behalf of Stephen E. Silverman, information, which is material to patentability as defined in Title 37 of the Code of Federal Regulations of United States of America, Section 1.56, and which is material to the examination of the patent application as identified above, namely, information where there is a substantial likelihood that a reasonable patent examiner in the United States Patent and Trademark Office would consider that information important in deciding whether to allow the application to issue as a United States patent. I further declare that I understand and believe that Stephen E. Silverman disclosed all such information through his attorneys to the United States Patent and Trademark Office and that Stephen E. Silverman had received copies of such submissions as made to the United States Patent and Trademark Office from his attorneys.

I hereby further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements are made with the knowledge that willful false statements and the like so

made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the patent application referenced above or of any patent to issue therefrom.

Marilyn K. Silverman  
Name Printed

Marilyn K. Silverman  
Signature

16 N. Calvin Rd  
Residential Street Address

Weston, Ct. 06883  
City and State / Mailing Address

Executor of Estate of Stephen E. Silverman  
Print above, as applicable, one of the following:  
Executor or Administrator or Representative  
of the Estate of Stephen E. Silverman

4/11/06  
Date



### Allowed Claims

2. A method for evaluating near-term suicidal risk by analysis of a series of spoken words, comprising the steps of:

- a) converting the spoken series of words into a signal having discrete time varying amplitudes indicative of energy content of said words as spoken;
- b) dynamically monitoring said signal to detect commencement of said words of said series and energy content thereof;
- c) identifying the speaker has having a relatively high near-term risk of suicide if detected energy content of said words and frequency of commencement of said words are both lower, by predetermined amounts, than the occurrence of the same in the speech of individuals in good mental health having no near-term suicidal risk.

3. A method for evaluating near-term suicidal risk by analysis of a series of spoken words, comprising the steps of:

- a) converting the spoken series of words into respective signals having time varying frequency;
- b) monitoring said signals to measure time varying frequency at the commencement of respective ones thereof;
- c) identifying the person as having relatively high near-term suicidal risk if measured time varying frequency at word commencement varies by less than a predetermined amount than in the speech of individuals in good mental health having no near-term suicidal risk.

4. The method of claim 3 wherein said monitoring step includes:
  - a) monitoring said signals to measure time variations in fundamental frequency at the commencement of respective ones thereof;
  - b) and wherein said identifying step further comprises:
  - c) identifying the person has having relatively high near-term suicidal risk if measured word commencement time varying fundamental frequency varies less than a predetermined amount than in the speech of individuals in good mental health having no near-term suicidal risk.
5. A method for evaluating near-term suicidal risk by analysis of a series of spoken words, comprising the steps of:
  - a) converting the spoken series of words into a signal having time varying frequency;
  - b) dynamically monitoring said signal to measure time varying frequency thereof and computing an average value of the same;
  - c) identifying the person as having relatively high near-term suicidal risk if measured average time varying frequency of said signal is lower by a predetermined amount than in the speech of individuals in good mental health having no near-term suicidal risk.
6. A method for evaluating near-term suicidal risk by analysis of spoken words, comprising the steps of:
  - a) converting the spoken words into a signal indicative of the syntactic structure thereof;

- b) comparing the syntactic structure represented by said signal with known patterns of accepted syntax to identify whether some or all of the syntax of said spoken words fits a grammatically accepted pattern;
  - c) comparing initial amplitude of a spoken word identified as fitting said grammatically accepted pattern with amplitude(s) of preceding and succeeding contiguous words spoken by said person;
  - d) identifying the person as having a relatively high near-term risk of suicide if said initial amplitude of said spoken word exceeds amplitude of said preceding and/or succeeding contiguous words by more than a preselected amount based on speech of individuals in good mental health having no near-term suicidal risk.
7. The method of claim 6 wherein said words constitute a series of spoken words.
8. The method of claim 6 wherein said signal is an electrical signal.
12. The method of claim 2 further comprising the steps of :
- a) dynamically monitoring said signal to detect presence therein of parameters conventionally indicating anxiety in the speaker; and
  - b) identifying the person as having a relatively high near-term risk of suicide in the absence of such parameters from such signal thereby indicating lack of speaker anxiety.
13. The method of claim 4 further comprising the steps of :

- a) dynamically monitoring said signal to detect presence therein of parameters conventionally indicating anxiety in the speaker; and
  - b) identifying the person as having a relatively high near-term risk of suicide in the absence of such parameters from such signal thereby indicating lack of speaker anxiety.
14. The method of claim 6 further comprising the steps of :
- a) dynamically monitoring said signal to detect presence therein of parameters conventionally indicating anxiety in the speaker; and
  - b) identifying the person as having a relatively high near-term risk of suicide in the absence of such parameters from such signal thereby indicating lack of speaker anxiety.
16. The method of claim 5 further comprising the steps of :
- a) dynamically monitoring said signal to detect presence therein of parameters conventionally indicating anxiety in the speaker; and
  - b) identifying the person as having a relatively high near-term risk of suicide in the absence of such parameters from such signal thereby indicating lack of speaker anxiety.
19. The method of claim 7 further comprising the steps of :
- a) dynamically monitoring said signal to detect presence therein of parameters conventionally indicating anxiety in the speaker; and
  - b) identifying the person as having a relatively high near-term risk of suicide in the absence of such parameters from such signal thereby indicating lack of speaker anxiety.

20. The method of claim 8 further comprising the steps of :

- a) dynamically monitoring said signal to detect presence therein of parameters conventionally indicating anxiety in the speaker; and
- b) identifying the person as having a relatively high near-term risk of suicide in the absence of such parameters from such signal thereby indicating lack of speaker anxiety.



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As the named inventor on the above-referenced pending United States patent application, I hereby declare that I believe that I invented the subject matter that is presently claimed, in the United States patent application referenced above, and I am the original, first and joint inventor of such subject matter and further that I understand that the claims pending in the United States patent application referenced above are those attached hereto as Attachment 1.

I hereby further declare that the subject matter defined by the attached claims as currently pending in the above-referenced United States patent application was part of my invention and was invented by me before the effective filing date to which the application, as above identified, is entitled for the invention.

I hereby further state that I have again reviewed and affirm that I understand the contents of the application specification, including the claims pending in the application as such claims are attached hereto as Attachment 1.

I again acknowledge the duty to disclose information, which is material to patentability as defined in Title 37 of the Code of Federal Regulations of United States of America, Section 1.56, and which is material to the examination of the patent application as identified above, namely, information where there is a substantial likelihood that a reasonable patent examiner in the United States Patent and Trademark Office would consider that information important in deciding whether to allow the application to issue as a United States patent. I further declare and affirm that I have disclosed all such information through our attorneys to the United States Patent and Trademark Office and have received copies of such submissions as made to the United States Patent and Trademark Office from our attorneys.

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Date: 4/11/06

Marilyn K. Silverman  
MARILYN K. SILVERMAN

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### Allowed Claims

2. A method for evaluating near-term suicidal risk by analysis of a series of spoken words, comprising the steps of:

- a) converting the spoken series of words into a signal having discrete time varying amplitudes indicative of energy content of said words as spoken;
- b) dynamically monitoring said signal to detect commencement of said words of said series and energy content thereof;
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3. A method for evaluating near-term suicidal risk by analysis of a series of spoken words, comprising the steps of:

- a) converting the spoken series of words into respective signals having time varying frequency;
- b) monitoring said signals to measure time varying frequency at the commencement of respective ones thereof;
- c) identifying the person as having relatively high near-term suicidal risk if measured time varying frequency at word commencement varies by less than a predetermined amount than in the speech of individuals in good mental health having no near-term suicidal risk.

4. The method of claim 3 wherein said monitoring step includes:
  - a) monitoring said signals to measure time variations in fundamental frequency at the commencement of respective ones thereof;
  - b) and wherein said identifying step further comprises:
  - c) identifying the person has having relatively high near-term suicidal risk if measured word commencement time varying fundamental frequency varies less than a predetermined amount than in the speech of individuals in good mental health having no near-term suicidal risk.
5. A method for evaluating near-term suicidal risk by analysis of a series of spoken words, comprising the steps of:
  - a) converting the spoken series of words into a signal having time varying frequency;
  - b) dynamically monitoring said signal to measure time varying frequency thereof and computing an average value of the same;
  - c) identifying the person as having relatively high near-term suicidal risk if measured average time varying frequency of said signal is lower by a predetermined amount than in the speech of individuals in good mental health having no near-term suicidal risk.
6. A method for evaluating near-term suicidal risk by analysis of spoken words, comprising the steps of:
  - a) converting the spoken words into a signal indicative of the syntactic structure thereof;

- b) comparing the syntactic structure represented by said signal with known patterns of accepted syntax to identify whether some or all of the syntax of said spoken words fits a grammatically accepted pattern;
  - c) comparing initial amplitude of a spoken word identified as fitting said grammatically accepted pattern with amplitude(s) of preceding and succeeding contiguous words spoken by said person;
  - d) identifying the person as having a relatively high near-term risk of suicide if said initial amplitude of said spoken word exceeds amplitude of said preceding and/or succeeding contiguous words by more than a preselected amount based on speech of individuals in good mental health having no near-term suicidal risk.
7. The method of claim 6 wherein said words constitute a series of spoken words.
8. The method of claim 6 wherein said signal is an electrical signal.
12. The method of claim 2 further comprising the steps of :
- a) dynamically monitoring said signal to detect presence therein of parameters conventionally indicating anxiety in the speaker; and
  - b) identifying the person as having a relatively high near-term risk of suicide in the absence of such parameters from such signal thereby indicating lack of speaker anxiety.
13. The method of claim 4 further comprising the steps of :

- a) dynamically monitoring said signal to detect presence therein of parameters conventionally indicating anxiety in the speaker; and
  - b) identifying the person as having a relatively high near-term risk of suicide in the absence of such parameters from such signal thereby indicating lack of speaker anxiety.
14. The method of claim 6 further comprising the steps of :
- a) dynamically monitoring said signal to detect presence therein of parameters conventionally indicating anxiety in the speaker; and
  - b) identifying the person as having a relatively high near-term risk of suicide in the absence of such parameters from such signal thereby indicating lack of speaker anxiety.
16. The method of claim 5 further comprising the steps of :
- a) dynamically monitoring said signal to detect presence therein of parameters conventionally indicating anxiety in the speaker; and
  - b) identifying the person as having a relatively high near-term risk of suicide in the absence of such parameters from such signal thereby indicating lack of speaker anxiety.
19. The method of claim 7 further comprising the steps of :
- a) dynamically monitoring said signal to detect presence therein of parameters conventionally indicating anxiety in the speaker; and
  - b) identifying the person as having a relatively high near-term risk of suicide in the absence of such parameters from such signal thereby indicating lack of speaker anxiety.

20. The method of claim 8 further comprising the steps of :

- a) dynamically monitoring said signal to detect presence therein of parameters conventionally indicating anxiety in the speaker; and
- b) identifying the person as having a relatively high near-term risk of suicide in the absence of such parameters from such signal thereby indicating lack of speaker anxiety.